

# **Ecological Forecasting – An Introduction**

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**EPA Science Forum 2004**



# What is Ecological Forecasting?



**Two General Approaches**

09/23 02:59 EDT 09/23 08:59 CEST 09/23 14:59 CST

# Predicting the Future

THE  
WEATHER  
CHANNEL

23 Sep 2003 05:59 GMT



# **More Frequently Defined As**

**“A forecast is the best estimate from a particular method, model, or individual. The public and decision makers understand that a forecast may or may not turn out to be true.”**

**Reid et al. (2002) ... Millennium Assessment  
(MA)**

# General Goals of Ecological Forecasting

- Vulnerability/risk assessments based on current patterns of conditions and stresses
- Vulnerability/risk assessments based on potential future environments
  - Predictions (e.g., land cover change models)
  - Scenarios (based on plausible changes of future environmental change)
  - Scenarios based on stakeholder input
- Adopt management approaches to reduce vulnerability and risks

# Forecasting Generally Involves

- Extensive use of models relating ecological endpoints and important processes to biophysical variables (conditions) and natural and anthropogenic stress
- Scenario development of future conditions of biophysical variables and stressors ... to evaluate the consequences of certain types of changes
- Scenarios of change not prediction

# Forecasting Applications

- **Invasive Species ... vulnerability to spread (USGS/NASA/EPA)**
- **Multiple Ecological Resource Vulnerability (ReVA)**
  - **Current vulnerability**
  - **Consequences of landscape change projections/scenarios on ecological endpoints and processes**
- **Estuary and Coastal Waters ... vulnerability of important processes and resources to future climate change scenarios (NOAA)**

# Forecasting Applications

- **Disaster forecasting**
  - **Fire/floods (many organizations)**
- **Alternative future urbanization consequences (7 counties in Maryland)**
- **Alternative landscape futures ... impact on multiple resources (EPA Corvallis)**
- **Interagency Working Group on Earth Observations (IWGEO)**



# Some Limitations/Issues

- Many assumptions about future change
- “Space-for-Time” construction of models to determine consequences of future change
- Change models based on historical patterns of change which may not accurately reflect future changes ... sequence and magnitude of drivers, and species responses, may not repeat history
- Ecosystems are complex
- Scaling (upscaling and downscaling)
- Limited number of fixed monitoring sites to establish pattern of historical change and relationships to drivers of change

A night photograph of a mosque with a tall minaret and a series of bright lights in the sky. The mosque's architecture features multiple domes and arches, illuminated by warm lights. The sky is dark blue, and a series of bright, circular lights are arranged in a horizontal line across the upper portion of the image. The text is overlaid on the image in a bold, yellow, serif font.

**BUT ALL THAT SAID**

**LOTS OF POTENTIAL APPLICATIONS**  
**... as you will see in this session**